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Pasture Improvement and Management

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Pasture Improvement and Management

W. K. Kennedy

Good pasture is a cheap source of feed. A dairy cow can maintain herself and produce up to 40 pounds of milk on top quality pasture. Yet many farmers get only 6–8 weeks of full use from their grazing land. This bulletin shows how you can triple the production of poor or marginal pasture.

Which Pasture Land Should You Improve?

Improve your best pasture land first. If possible, choose land that can be included in a rotation so that plowing and reseeding can be done periodically. Improve no more than ½ acre of seeded pasture or 1 acre of permanent pasture per cow equivalent unless excess spring growth can be harvested as hay or silage.

If you have ***native pasture,*** Kentucky bluegrass and white clover will soon replace less productive grasses and weeds where pasture is limed, fertilized, and properly grazed. Though better than unimproved land, such pastures produce little midsummer feed and should be reseeded for best results.

A ***reseeded permanent pasture*** calls for a long-lived legume. Empire birdsfoot trefoil is the only legume that fills this bill. Empire does not recover from grazing as fast as European types of trefoil, but it is longer-lived and withstands closer grazing. Timothy is the grass usually sown with Empire.

For ***pasture land in a rotation*** that is ***moderately to poorly drained,*** ladino clover and grass or European trefoil and grass mixtures are recommended. Choose ladino clover for land with good moisture supplies where a relatively short (2–4 year) stand will be sufficient. Use European trefoil for land subject to midsummer drought or where stands must remain longer than 4 years.

When associated with bromegrass or timothy, ladino withstands continuous grazing fairly well. With orchard grass it must be rotationally grazed. European trefoil will not stand continuous grazing under any conditions, and should never be seeded with or-

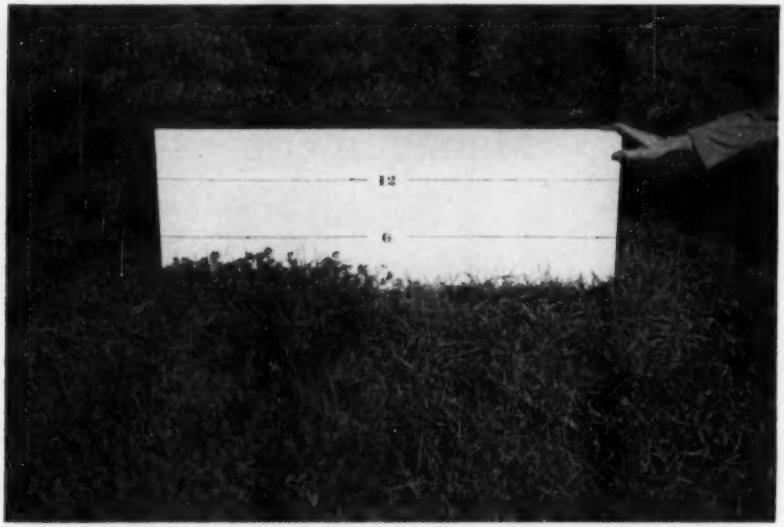

Figure 1. **Regrowth of European and Empire types of birdsfoot trefoil. European (*left*) grows more erect and recovers faster after cutting than does Empire (*right*).**

chard grass. Bromegrass or timothy is recommended here.

For ***well drained rotational pasture,*** nothing surpasses an alfalfa–grass combination. Alfalfa cannot stand continuous grazing and needs to make a regrowth of 10–12 inches between grazings. For fields used solely for grazing, ladino clover is a desirable addition to the mixture. Where drainage is spotty and the stand is to be longer than 2 years, use European trefoil in place of ladino.

As the associated grass, orchard grass is more productive than smooth bromegrass or timothy. Orchard grass, however, is hardest to manage since it becomes unpalatable as it matures.

How to Establish a New Seeding

1. Find out your lime needs

Your efforts and dollars will be wasted if you overlook this important requirement. A Cornell pH Test Kit can be used to determine the pH, or acidity, of your soil. Alfalfa requires a pH of 6.5 or above. Other legumes do reasonably well with a pH not lower than 6.0.

When large amounts of lime are needed, plow some under and apply some after plowing. If a moderate amount is used, apply all of it after plowing — the theory being that lime should always be concentrated in the top 2–3 inches near the seed.

Figure 2. **Lime on alfalfa. Plots above were prepared and seeded exactly alike, except that plot at right received 4 tons of lime and plot at left was unlimed.**

2. Kill the old sod

If possible, plow and plant to a cultivated crop for 1 year. This kills the old sod and clears the land of many weeds that would otherwise seriously compete with the new seeding.

On steep, stony, or wet land, chemical weed control (see Cornell Extension Bulletin 821, *Chemical Weed Control*) plus summer tillage may be substituted for plowing. Be sure you have a firm seedbed in either case.

3. Make the seeding

This is usually done in a small-grain crop. Legumes and timothy can be seeded with a grain drill equipped with a forage seed attachment if one precaution is taken: if the seed box is on the front of the drill, hose extensions must be used to drop the seed *behind* the furrow openers. Seed that drops in front might be covered too deeply.

Band seeding is desirable where soil fertility is low. Extend hoses 12 inches behind furrow openers and 2 inches above the ground (See Cornell Extension Bulletin 1048, *Making Better Forage Seedings*). This places seed directly over the fertilizer and small grain. To band-seed legumes in winter grain, drill in superphosphate in the spring and seed the legume directly over it. Do not use a complete fertilizer in this situation because the seeds may come into direct contact with the fertilizer. Too close contact with N and K causes poor germination.

To sow orchard or bromegrass, use a separate seeder designed for large grass seed, *or* mix the grass seed with the small grain in the drill and set the drill to run no more than 1 inch deep.

When to make the seeding. All the recommended grasses, except orchard grass, can be sown in the fall when winter grain is the companion crop. Orchard grass and legumes must be spring or summer seeded. The clovers — red and ladino — and the grasses make their best growth in cool weather. Thus early seeding is desirable, especially if a companion crop is used. Any spring seeding made in winter grain must get a good start before the grain shades it or competes for moisture.

Alfalfa can be summer seeded where rainfall is adequate. A "rule of thumb": if the soil is dry, don't seed. Alfalfa should be in by August 15, preferably August 1. Later seedings will not survive most New York winters.

Controlling the companion crop. If conditions are unfavorable for rapid seedling establishment, or if birdsfoot trefoil with poor seedling vigor is used, consider grazing the small grain to reduce its competition, cutting it for hay, or omitting it entirely. If you want it to mature for grain, be careful not to let it lodge, since this will kill the seeding. Many excellent seedings are injured by poor combining — too much grain (oats) is allowed to pass through with the straw, and a heavy volunteer stand in the fall smothers the young legumes and grasses.

4. Apply sufficient fertilizer

To get the seeding off to a good start, use a complete fertilizer. For soils with high potash-supplying power, such as those in central New York and most clay soils, use fertilizer with a 1–2–1 ratio. On soils with medium and low potash-sup-

Figure 3. **Birdsfoot trefoil seedlings in oats. Pastures are usually seeded with a small grain.**

plying power, such as those with hardpans and those from gravels, sands, and high-lime loamy soils, a 1–2–2 ratio is recommended. Use enough fertilizer to supply about 40 pounds of N, 80 pounds of P_2O_5, and 40–80 pounds of K_2O per acre.

If the soil is of low fertility, band-seed as discussed earlier. If this is not possible, increase the phosphate up to 100 pounds of P_2O_5 per acre.

Top dressing with 5–6 loads of manure per acre pays extra dividends. When applied in the spring, it protects the seedlings from drying out. When applied in the fall it insulates against frequent temperature changes. Heavier applications are not desirable since they promote grassy growth to the detriment of the legumes. If noxious weed seeds are present in the manure, keep it piled for 6 weeks before use.

5. Keep the weeds under control

This is best done by growing a cultivated crop a year before seeding. If the land is unsuitable for cultivation, a weed spray, such as Dalapon, can be used. (Cornell Extension Bulletin 821 gives full details.)

A newly seeded pasture should be checked frequently. If numerous broadleaf weeds appear, spray with one of the dinitro chemicals while the weeds are small. If weeds outgrow the legume to the extent that they or the small grain form a protective canopy over the legume, the *amines* of 2,4-D or MCP can be used. Spray pressure must be kept low (25 pounds maximum).

If a heavy weed growth occurs in seedings made without a companion crop, the seeding should be mowed. Do it early; otherwise the clippings must be raked and removed to avoid smothering the seeding.

6. Don't overuse the pasture in the seeding year

Usually pastures should not be grazed the first year. Occasionally forage growth may be great enough to permit light grazing by late August. Keep in mind the date of the first killing frost in your area (Fig. 4, page 8) and remove stock 4–6 weeks before that time, or before the stubble is grazed down to a height of 4–6 inches, whichever comes first.

How to Care for the Established Pasture

Fertilizer facts

Phosphorus. Most New York soils are low in phosphorus. If soil tests of your pasture land show a low phosphorus level, apply at least 100 pounds of P_2O_5 every other year to a legume–grass pasture, or 50 pounds yearly. This should meet the needs of the crop and begin to build a reserve.

Potassium. Though many New York soils have good potassium-

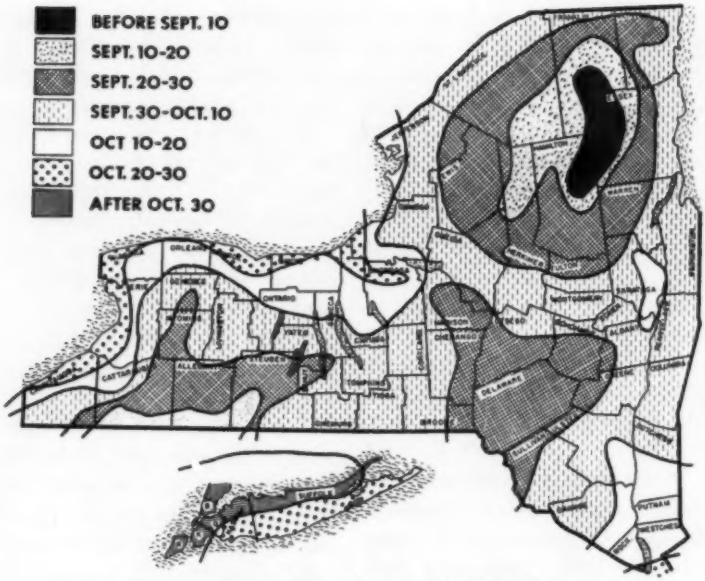

Figure 4. **Map of frost dates in New York State.**

supplying power, few supply enough for top production. Again a soil test is your best guide (see your county agent for this).

Most soils release enough potassium each year for early spring growth. Therefore, application can be delayed until after the first cutting or grazing. On coarse-textured soils, K is most efficiently used when the annual requirement is split into 2 or more applications.

Nitrogen. As long as the pasture contains 40 percent or more legumes, do not apply nitrogen fertilizer. This would result in vigorous grass growth and loss of the legume. With less than 40 percent legumes, N can be applied profitably; below 25 percent legumes, N must be applied liberally for top yields. Orchard grass gives economical response up to 300 pounds/acre. Almost as much N can be used economically on Saratoga smooth bromegrass, but less on other brome varieties, timothy, or bluegrass.

Minor elements. Few New York soils require any of these for forage crops. Some sandy soils require boron for maximum yields of alfalfa.

Grazing Management Systems

Any number of grazing management systems can be followed, depending on the farmer's preference. The important thing to remember

Figure 5. **Nitrogen on orchard grass (*left*) and timothy (*right*). These plots received nitrogen at the rate of 200 pounds/acre/year in 4 applications. Orchard grass uses nitrogen more efficiently than timothy does, particularly after the first cutting or grazing. Arrows on the stake show height of grass in July after first harvest.**

is that 2–4 times as much pasture acreage will be needed in late July and August as will be needed in May–June.

Continuous grazing

Continuous grazing of one large pasture is wasteful. Part of the forage becomes coarse and unpalatable before it can be eaten, and animals refuse to eat this material even when other patches have been heavily grazed. Thus under- and overgrazing occur simultaneously. Tall-growing legumes may be weakened or killed off in overgrazed areas.

Kentucky bluegrass and white clover, as well as Empire birdsfoot trefoil, can stand continuous grazing fairly well. But you can improve utilization of the pasture by dividing it into 2 or 3 smaller areas. Each area can be grazed for several weeks, then given a chance to recover.

Rotational grazing

This system is highly desirable for mixtures containing ladino clover, alfalfa, European birdsfoot trefoil, and tall-growing grasses. The pasture should be divided into 5 or 6 sections large enough to carry the cattle for 5–10 days (1 acre for every 5 or 6 cows). They are moved from one area to another only after

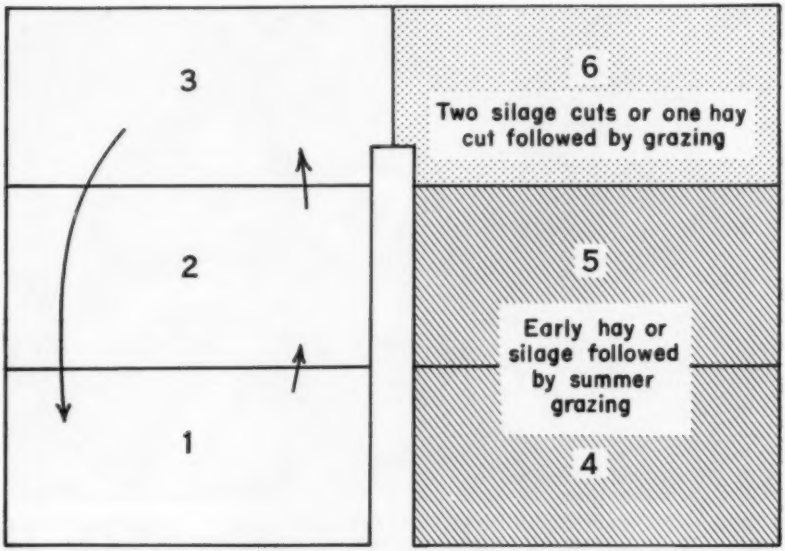

Figure 6. **Rotational grazing plan for a 40-cow herd on a 40-acre alfalfa–bromegrass pasture. The pasture is divided into six 6 2/3-acre paddocks. Each paddock is grazed in turn and the excess forage harvested as indicated.**

all the available forage has been eaten. Each section, or paddock, is given 3–5 weeks to recover before being regrazed. An early cutting of hay or silage is taken from the unused paddocks so that regrowth will be available in all of them as rate of pasture growth starts to decline in midsummer.

Strip grazing

This is a further refinement of the rotational grazing system. Pasture is divided as for rotational grazing; then a cross fence restricts the cattle to what can be consumed in 12–24 hours (1 acre per day for 25–50 cows). Generally a single cross fence is used, and moved once or twice a day. Cattle go back across the grazed area for shade and water. In Cornell tests, strip grazing was not superior to rotational grazing and the labor costs were much higher. It is now recommended only when a limited feed supply is available and the farmer wishes to ration a portion of it each day.

Green-chopped feeding

This consists of harvesting the forage with a field chopper and hauling it to the cattle in dry lot.

Advantages of this practice are:

1. Loss from trampling and manure contamination is eliminated.

2. Fencing and watering costs are reduced or eliminated.

3. Distant fields can be used for feed.

4. Limited supplies of feed can be rationed during a drought.

Disadvantages include:

1. Maintaining high quality forage throughout the growing season is essential; production per animal is reduced if forage becomes too mature.

2. Frequent cutting of a perennial, especially alfalfa, weakens it more than does rotational grazing.

3. Chopped forage often heats and becomes inedible unless harvested twice a day.

4. Another chore is added that must be done every day and that may compete with other farm jobs. Provision must be made for machinery breakdown or muddy fields.

Green-chopped feeding is most likely to be profitable where pasture land is suitable for the intensive growth of tall annual crops such as Sudan grass, sorghums, or corn for green feeding. Where some of the pasture land is in tall-growing crops, these can be green-chopped for use as a supplement to the pastures being grazed. This prevents undue waste of taller crops and also overcomes some of the disadvantages of a complete green-chopped feeding program.

Mowing

Good grazing management reduces the need for mowing. A pasture should be mowed at least once, and usually twice, a season — in the spring to cut off unpalatable forage that has not been grazed, and again in late summer for weed control. When pastures are undergrazed, more frequent mowing is necessary. By doing it a day or two before stock is removed from the pasture, much of the clippings will be eaten.

If your pasture land is not a part of your tillable acreage it should be cleared of stones, brush, stumps, and hummocks, so that a good mowing job will be possible.

Scattering Droppings

It is doubtful whether scattering droppings with a flexible grass harrow or similar equipment is justified, except possibly on grassy pastures carrying well over 1 cow per acre. Harrowing damages the crowns, and is not recommended for alfalfa and birdsfoot trefoil pastures.

What About Irrigation?

The apparent response of forage crops to irrigation is often due to increased water content or succulence of the crop with very little increase in dry matter. In southeastern New York, where summer rainfall is 18 inches or better, little or no increase in dry matter results from irrigation. In western New York, where summer rainfall is less than 18 inches, irrigation has increased yields of excellent pastures by about 1 ton of dry matter per acre.

Some points to consider

(1) An adequate water supply that will cost little or nothing to develop is essential. About 40,000 gallons should be available for each acre-inch to be applied to the land. Pastures require 3–4 irrigations for a total yearly application of 4 1/2 to 6 inches. At least 2 to 2 1/2 million gallons of water is needed in a dry season, because it seldom pays to irrigate less than 10 acres.

(2) Even on deep, sandy soils, unirrigated alfalfa-grass will yield nearly as much as irrigated ladino-grass. Grow alfalfa wherever possible on well-drained droughty soils.

(3) Adequate lime and fertilizer in combination with the proper forage usually increases production far more economically than does irrigation.

(4) If you do decide on irrigation, consult an expert who will design a system for your individual farm. Avoid buying a packaged unit.

Supplementary Pasture

Under very favorable conditions, summer pasture is about half that obtained during spring. Under less favorable conditions, summer pasture may be only one-fourth as productive.

To offset the seasonal decline a farmer may (1) feed hay, silage, or green-chopped feed; (2) graze hay meadows; (3) increase production of perennial crops through better varieties, adequate lime, and fertilizer; (4) increase pasture acreage and harvest a greater portion for hay or silage in May and June; (5) grow annual crops such as Sudan grass.

Sudan grass produces excellent summer pasture in central and southern New York. The millets are more suitable for elevations above 2000 feet and in northern New York. The cost of producing these crops, however, should not be ignored. The land used to grow Sudan grass might have produced a crop of corn with more TDN per acre and at a relatively small increase in cost.

Cooperative Extension Service, New York State College of Agriculture at Cornell University and the U. S. Department of Agriculture cooperating. In furtherance of Acts of Congress May 8, June 30, 1914. M. C. Bond, Director of Extension, Ithaca, New York.